REMARKS

The present invention relates to a curable composition.

In the Office Action dated September 21, 2010, it is appreciated that the Examiner considered Applicant's Information Disclosure Statements (IDSs) filed May 21 and September 7, 2010, and that the Examiner considered Applicant's previous Amendment to overcome the previous rejections.

However, the Examiner has cited and relied upon one of the references cited in the IDS of September 7, 2010, viz., JP 2003/313302 (the '302 reference) as basis for a new sole rejection of claims 1 - 4, 6, 7, 9, 11, 12, 16 - 18 and 20 under 35 U.S.C. § 103(a). Further in this regard, at page 3 of the Office Action the Examiner provided technical comments explaining the basis for the rejection.

In the present Amendment, Applicant has added new claims 25 and 26, the support for which is identified below, and Applicant provides a detailed explanation regarding the distinctions of the present invention *vis-a-vis* the '302 reference. Based thereon, withdrawal of the sole remaining rejection under 35 U.S.C. § 103(a) is respectfully requested.

Referring to present specification, in paragraph [0043] of U.S. Published Application No. US 2007/0173620, the present description mentions oxyalkylene polymers, vinyl polymers, unsaturated hydrocarbon polymers, polyester polymers, and polyurethanes as examples of the main chain skeletons of the reactive silyl group-containing organic polymer (A) and organic polymer (B), and paragraph

[0044] states that oxyalkylene polymers are preferable. In other words, it is clear that the present description discloses both a curable composition containing an organic polymer that has a vinyl polymer in a main chain skeleton and a curable composition containing no organic polymer that has a vinyl polymer in a main chain skeleton.

Furthermore, the Examples in the present description also include a curable composition containing no organic polymer that has a vinyl polymer in a main chain skeleton.

Present claim 1 is directed to:

a curable composition

which comprises an organic polymer (A) containing reactive silyl groups represented by the general formula (1) given below wherein a is 3 and an organic polymer (B) containing an average of 0.5 to 1.0 reactive silyl groups represented by the general formula (1) given below per molecule

$-Si(R^1_{3-a})X_a$ (1)

wherein R^1 represents an alkyl group containing 1 to 20 carbon atoms, an aryl group containing 6 to 20 carbon atoms, an aralkyl group containing 7 to 20 carbon atoms or a triorganosiloxy group represented by $(R')_3SiO-$ (in which the three R' groups may be the same or different and each represents a monovalent hydrocarbon group containing 1 to 20 carbon atoms) and, when there are two or more R^1 groups, they may be the same or different, and X represents a hydroxyl group or a hydrolysable group and, when there are two or more X groups, they may be the same or different, and a represents 1, 2 or 3, and

wherein the main chain of each of the organic polymers (A) and (B) is an oxyalkylene polymer,

the molecular weight of the organic polymer (B) is lower than the molecular weight of the organic polymer (A) by not less than 3,000, and

the organic polymer (B) contains no urethane bond or urea bond with in the molecule.

Also, present claim 2 is directed to:

a curable composition

which comprises an organic polymer (A) containing reactive silyl groups represented *by* the general formula (1) given below wherein a is 3 and an organic polymer (B) containing an average of 0.5 to 1.0 reactive silyl groups represented by the general formula (1) given below per molecule

$-Si(R^1_{3-a})X_a$ (1)

wherein R^1 represents an alkyl group containing 1 to 20 carbon atoms, an aryl group containing 6 to 20 carbon atoms, an aralkyl group containing 7 to 20 carbon atoms or a triorganosiloxy group represented by $(R')_3SiO-$ (in which the three R' groups may be the same or different and each represents a monovalent hydrocarbon group containing 1 to 20 carbon atoms) and, when there are two or more R^1 groups, they may be the same or different, and X represents a hydroxyl group or a hydrolysable group and, when there are two or more **X** groups, they may be the same or different, and a represents 1, 2 or 3, and

wherein the main chain of each of the organic polymers (A) and (B) is an oxyalkylene polymer,

the molecular weight of the organic polymer (B) is lower than the molecular weight of the organic polymer (A) by not less than 3,000, and

the reactive silyl group in the organic polymer (B) is a reactive silyl group represented by the general formula (1) in which a is 2.

From the foregoing, it is seen that one of the technical features of the curable compositions as set forth in present claims 1 and 2 is that both compositions comprise as the component (A) an oxyalkylene polymer having reactive silyl groups containing **three hydrolysable groups** per silicon atom.

In general, cured products obtained from an organic polymer having reactive silyl groups containing three hydrolysable groups per silicon atom tend to be very fragile and low in extensibility. Further, when the molecular weight is increased to secure the extensibility, the problem of viscosity increase arises. Thus, it has been earnestly desired that the cured products derived from an organic polymer having reactive silyl groups containing three hydrolysable groups per silicon atom be improved in mechanical physical properties and reduced in viscosity (see specification paragraphs [0005] and [0006] in Published Application No. US 2007/0173620).

As for the present invention, the curable compositions as set forth in claims 1 and 2 comprise a given oxyalkylene polymer (component (A)) having reactive silyl groups containing three hydrolysable groups per silicon atom, and a given oxyalkylene polymer (component (B)) containing an average of 0.5 to 1.0 reactive silyl groups. The present invention therefore can provide a curable composition which can provide cured products having good recovery, durability, creep resistance and mechanical physical properties which can be adjusted so as to be adequate for the use as a sealing material or adhesive, and further, which is low in viscosity and good in workability (see specification paragraph [0019]). Particularly with regard to the recovery, the present claimed invention can provide a curable composition which can provide cured products having excellent recovery even when having low modulus.

This effect of the present invention is apparent also from the results of the Examples in the present specification. Tables 1 to 4 and Fig. 1 show the following results. That is, curable compositions have excellent recovery even when having low modulus in the case that the compositions comprise an oxyalkylene polymer having reactive silyl groups containing three hydrolysable groups per silicon atom, and an oxyalkylene polymer containing an average of 0.5 to 1.0 reactive silyl groups per molecule; however, curable compositions have low recovery when having low modulus in the case that the compositions comprise an oxyalkylene polymer having reactive silyl groups containing two hydrolysable groups per silicon atom, and an oxyalkylene polymer containing an average of 0.5 to 1.0 reactive silyl groups per molecule. This means that the recovery depends on the modulus in the case that the value of a in a reactive silyl group in the component (A) is 2, but the recovery hardly depends on the modulus in the case that the value of a in a reactive silyl group in the component (A) is 3. The present invention can therefore provide an unexpected effect that the curable composition retains high recovery even when having low modulus.

Comparing the present claim 1 and the document '302 (particularly P15 and P17 in Table 3), the Examiner pointed out that "In view of the very limited selection of silyl terminal groups disclosed by '302 (in which only "a" values of 2 and 3 are disclosed) one having ordinary skill in the art would have immediately envisioned a terminal silyl group having 3 hydrolyzable groups for the polymer P17 and in this manner the teachings of '302 anticipate that claimed. In the alternative, if not anticipated, then one having ordinary skill in the art would have found the selection of a silyl terminal group having 3 hydrolyzable groups rather than the silyl terminal group having 2 hydrolyzable groups to have been obvious".

According to the '302 document, P15 is a polyether polymer having a trimethoxysilyl group (a = 3) at one terminal, and P17 is a polyether polymer having an average of 1.6 methyldimethoxysilyl groups (a = 2) at a molecular terminal.

Although the Comparative Examples in the present specification do not include a curable composition corresponding to the curable composition containing P15 and P17, an estimation can be made as to the recovery of such a curable composition containing P15 and P17, as follows:

For this purpose, reference is made to JP 2005-213446 A (patent application which was filed by the same inventor as the present application and the priority date of which is the same as the present application); hereinafter, the application is also referred to as the '446 application.

Comparative Example 8 in the '446 application shows that the curable composition containing, as the resin component, only polyoxypropylene having an average of 1.6 methyldimethoxysilyl groups per molecule, has an M100 value of 1.46 MPa.

Comparative Example 5 in the '446 application shows that the curable composition, containing polyoxypropylene having an average of 1.6 methyldimethoxysilyl groups per molecule and polyoxypropylene having an average of 1 methyldimethoxy silyl group per molecule, has an M100 value of 0.78 MPa.

Example 6 in the '446 application shows that the curable composition, containing polyoxypropylene having an average of 1.6 methyldimethoxysilyl groups per molecule and

polyoxypropylene having an average of 1 trimethoxysilyl group per molecule, has an M100 value of 0.88 MPa.

Those results show that the values of M100 of the curable compositions are in the following relation:

Comparative Example 8 in '446 > Example 6 in '446 > Comparative Example 5 in the '446 application.

As stated above, the Comparative Examples in the present specification do not include a curable composition corresponding to the curable composition containing P15 and P17. Still, since the curable composition of Comparative Example 2 in the present specification has an M100 value of 0.62 MPa and the curable composition of Comparative Example 6 in the present specification has an M100 value of 0.30 MPa, the curable composition containing P15 and P17 can be scientifically estimated to have an M100 value in the range of 0.30 to 0.6 MPa.

Further, as described above, there is a correlation between M100 values and recovery values in the case that the value of a in a reactive silyl group in the component (A) is 2. Hence, the results that the recovery in Comparative Example 2 is 65% and the recovery in Comparative Example 6 is 43% in the present specification lead to an estimation that the recovery of the curable composition containing P15 and P17 is in the range of 43 to 65%.

This recovery of the curable composition containing P15 and P17 is very low as compared to the recovery of the presently claimed curable composition of, for example, 94% (Example 10) (see the following Table 1).

Also, P16 in the '302 reference is a polyether polymer containing an average of 0.9 methyldimethoxysilyl groups (a = 2).

A curable composition containing P16 and P17 corresponds to the curable composition of Comparative Example 6 in the present description. The recovery in Comparative Example 6 is 43%, which is very small as compared to the recovery of the claimed curable composition of, for example, 92% (Example 2) (see Table 1).

Table 1

		Present application		JP2006-213446
		Component (A)		Component (A)
		(a=3)	(a=2)	(a=2)
Compo-nent (B)	none	Comparative Example 1 (A1)/(B)=100/0 M100=0.87MPa Recovery=93%	Comparative Example 2 (A2)/(B)=100/0 M100=0.62MPa Recovery=85%	Comparative Example 8 M100=1.46MPa
	(a=2)	Example 2 (A2)/(B1)=70/30 M100=0.45MPa Recovery=92%	Comparative Example 6 (A1)/(B1)=70/30 M100=0.30MPa Recovery=43% (corresponding to P16 + P17 in '302)	Comparative Example 5 M100=0.78MPa
	(a=3)	Example 10 (A1)/(B4)=70/30 M100=0.45MPa Recovery=94%	No data M100=0.30~0.60MPa Recovery=43~85% (corresponding to P15 + P17 in '302)	Example 6 M100=0.88MPa

Accordingly, it is clear that the claimed curable compositions achieve an effect of providing a cured product having excellent recovery even when having a low modulus in the case that the compositions contain an oxyalkylene polymer having reactive silyl groups containing three hydrolysable groups per silicon atom, in place of an oxyalkylene polymer having reactive silyl groups containing two hydrolysable groups per silicon atom; and the above effect is an unexpected excellent effect that a person of ordinary skill in the art could not have expected.

In addition, the '302 reference lacks any disclosure or suggestion that provides a motivation for a person of ordinary skill in the art to change the oxyalkylene polymer having reactive silyl groups containing two hydrolysable groups per silicon atom, to the oxyalkylene polymer having reactive silyl groups containing three hydrolysable groups per silicon atom.

For the above reasons, it is respectfully submitted to be clear that the inventions as defined in present independent claims 1 and 2 as well as the dependent claims herein, are novel and not obvious over the `302 reference.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby earnestly solicited.

If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned attorney at the local Washington, D.C. telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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